

SECTION 22 11 01

WATER DISTRIBUTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Buried pipe and fittings.
- B. Above ground pipe and fittings.
- C. Joints and jointing materials.
- D. Valves.
- E. Piping accessories.

1.02 RELATED SECTIONS

- A. Site water distribution system is specified in Section 33 11 00 - Water Utility Distribution Piping. Coordinate the work of this Section with Section 33 11 00 - for a complete and finished installation.

1.03 MEASUREMENT AND PAYMENT

- A. Separate measurement or payment will not be made for the work required under this Section. All costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract.

1.04 REFERENCES

- 1. ASTM B42 Seamless Copper Pipe.
- 2. ASTM B43 Seamless Red Brass Pipe.
- 3. ASTM B68 Seamless Copper Tube (ASTM B68M – Seamless Copper Tube [Metric]).
- 4. ASTM B75 Seamless Copper Tube (ASTM B75M – Seamless Copper Tube [Metric]).
- 5. ASTM B251 Wrought Seamless Copper and Copper-Alloy Tube (ASTM B251M-Wrought Seamless Copper and Copper-Alloy Tube [Metric]).
- 6. ASTM B302 Threadless Copper Pipe (TP).
- 7. ASTM C425 Compression Joints for Vitrified Clay Pipe and Fittings.

8. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (ASTM C443M– Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets [Metric]).
9. ASTM C564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
10. ASTM C700 Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
11. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
12. ASTM D2235 Solvent Cement for Acrylonitrile – Butadiene – Styrene (ABS) Plastic Pipe and Fittings.
13. ASTM D2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
14. ASTM D2241 Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
15. ASTM D2447 Polyethylene (PE) Plastic Pipe Schedules 40 and 80, Based on Outside Diameter.
16. ASTM D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
17. ASTM D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
18. ASTM D2609 Plastic Insert Fittings for Polyethylene (PE) Plastic pipe.
19. ASTM D2661 Acrylonitrile – Butadiene – Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
20. ASTM D2662 Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
21. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
22. ASTM D2666 Polybutylene (PB) Plastic Tubing.
23. ASTM C4 Clay Drain Tile.
24. ASTM C14 Concrete Sewer, Storm Drain, and Culvert Pipe (ASTM C14M – Concrete Sewer, Storm Drain, and Culvert Pipe [Metric]).
25. ASTM C425 Compression Joints for Vitrified Clay Pipe and Fittings.

26. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (ASTM C443M – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets [Metric].
27. ASTM C564 Rubber Gaskets for Cast Iron Soil pipe and Fittings.
28. ASTM C700 Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
29. ASTM C1053 Borosilicate Glass Pipe and fittings for Drain, Waste, and Vent (DWV) Applications.
30. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
31. ASTM D2235 Solvent Cement for Acrylonitrile – Butadiene – Styrene (ABS) Plastic Pipe and Fittings.
32. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
33. ASTM D2666 Polybutylene (PB) Plastic Tubing.
34. ASTM D2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe.
35. ASTM D2729 Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
36. CISPI 301 Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
37. CISPI 310 Joints for Hubless Cast Iron Sanitary Systems.
38. American Water Works Association (AWWA):
 - a) AWWA C651 Disinfecting Water Mains
39. Manufacturers Standardization Society (MSS):
 - a) MSS SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends
 - b) MSS SP-80 Bronze Gate, Globe, Angle and Check Valves
40. Plumbing and Drainage Institute (PDI):
 - a) PDI WH 201 Water Hammer Arrestor Standard

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

- B. Shop Drawings: Submit Shop Drawings showing piping layout and pipe sizes, types valve sizes and locations of valves, shock absorbers, and escutcheon plates.
- C. Product Data: Submit manufacturer's product data for specified materials and equipment.
- D. Operation and Maintenance Data: Submit operation and maintenance data for the equipment provided in accordance with Section 01 78 23 - Operation and Maintenance Data.

1.06 SITE CONDITIONS

- A. Evacuations in which products will be buried shall be dry. Inspect surfaces and structures to, and on, which the water supply system will be installed before the work of this Section begins. Provide surfaces and structures capable of supporting the system and its weight.
- B. Coordinate the installation of the water supply system with other building systems and components so as to avoid conflicts of installation. Drawings are diagrammatic and not necessarily to scale. The Contractor shall not scale drawings for exact locations of installation of pipelines, valves, and equipment.

PART 2 - PRODUCTS

2.01 BURIED PIPE AND FITTINGS

- A. Requirements: Provide the types, sizes, and configurations of pipe, fittings, and miscellaneous materials and accessories as indicated.
- B. PVC Pipe and Fittings, 3 Inches and Smaller: Provide Class H as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- C. PVC Pipe and Fittings, 4 Inches and Larger: Provide Class K as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

2.02 ABOVE GROUND PIPE AND FITTINGS

- A. Requirements: Provide types, sizes, and configurations of pipe and fittings as indicated.
- B. Pipe and Fittings:
 - 1. 2 inches and smaller: Provide Class E as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
 - 2. 2-1/2 inches and larger: Provide Class S as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC. Unions for connecting steel pipe to copper tubing and tube shall be dielectric union type.

2.03 JOINTS AND JOINTING MATERIALS

- A. Provide flanges, bolts, nuts, and gaskets as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- B. Provide insulating joints, in accordance with Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, on metallic water lines where indicated.
- C. Provide expansion joints, in accordance with Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

2.04 VALVES

- A. Requirements: Valves shall be of sizes and types indicated. Valves two inches and smaller shall have threaded fittings and connections, and valves 2-1/2 inches and larger shall have flanged ends.
- B. Refer to Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for gate valves, globe valves, check valves, butterfly valves, air release valves, and gages.
- C. Pressure Reducing Valves: MSS SP-80 valves 2 inches and smaller shall be all bronze construction meeting requirements of MSS SP-80. MSS-SP-85 valves 2-1/2 inches and larger shall be all cast iron construction meeting requirements of MSS SP-70. Valves 2-1/2 inches and smaller shall have threaded connections. Valves 3 inches and larger shall have flanged connections. Valves shall be stainless steel spring-loaded, single-seated, and suitable for tight shutoff under dead-end conditions. Provide with renewable stainless steel seat, nylon inserted diaphragm, and bolted spring chamber. Valves shall be rated for 300 psi working pressure, adjustable from 25 to 75 psi, factory set at 50 psi. Pressure gauges (or gauge ports) shall be installed upstream and downstream of the pressure-reducing valve.
- D. Relief Valves:
 - 1. AGA Z21-22 pressure and temperature relief valves shall be AGA design certified, ASME listed and rated, with bronze body, brass trim, stainless steel spring and silicone rubber seat disc. Pressure and temperature valves shall be installed on all water heaters and hot water storage tanks, rated for heating capacity of water heater.
 - 2. Valves shall be ASME rated for intended service, and shall be single-seated, bronze body and trim, stainless steel spring, adjusting screw with cap and threaded connections for 2-1/2 inches and smaller valves, and flanged connections for 3 inches and larger valves.
- E. Backflow Preventer: Provide device, which is approved by the water utility company. As a minimum, backflow preventer shall be a reduced pressure principle assembly with two rising stem gate shut-off valves, two resilient seat ball-valve test cocks, and two replaceable resilient seat check valves. Backflow preventer shall be suitable for 175 psig operating pressure and 140 degrees F operating temperature and shall be of bronze construction with screwed inlet and outlet for 3 inches and smaller sizes, and cast iron, epoxy-coated construction with 150 pound flanged inlet and outlet for 4 inches and larger sizes.

2.05 PIPING ACCESSORIES

- A. Provide piping accessories of types and sizes indicated.
- B. Provide escutcheons as specified in Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services
- C. Provide shock absorbers of either bellows or diaphragm type, conforming to PDI WH 201, of size and location indicated.
- D. Wall sleeves and seals shall be in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Excavating and backfilling, including bedding and compacting requirements, shall conform to Section 33 05 28 - Trenching and Backfilling for Utilities.
- B. Provide concrete thrust blocks for elbows, tees, valves, and appurtenances on buried piping. Thrust blocks shall be constructed as indicated.
- C. Install piping true to line and grade, supported and guided to ensure alignment under all conditions. Installed piping shall clear obstructions, preserve headroom, and keep openings and passageways clear.
- D. Valves shall be accessible for operation and servicing. Valves located in furred spaces shall be accessible through access panels or access doors. Valves shall be installed as indicated, and shall not be installed having stems located below the horizontal position.
- E. Install unions at each connection to valves, equipment, and tanks. Soldered-to-threaded connections shall be made-up with male thread-to-solder adapters.
- F. After installation of pipes, ends of pipes shall be either capped or plugged. No piping shall be buried, furred in, or concealed before being inspected and tested.
- G. Install wall sleeves and insulating seals in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services.
- H. Provide access panels in accordance with Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

3.02 TESTING

- A. Test potable water system and hot water system, each hydrostatically in sections, to a pressure of at least 150 psi for not less than 15 minutes witnessed by the Engineer. Pressure-test pipe before burial and concealment. Repair leaks and retest the system until the system is leak free. Use testing instruments calibrated by a qualified laboratory in accordance with Section 01 45 00 - Quality Control. Test sequence shall be as follows:

1. Lines shall be fully flushed.
2. Lines shall be hydrostatically tested.
3. Lines shall be fully flushed.
4. Lines shall be fully disinfected.

3.03 SYSTEM DISINFECTION

- A. Before final acceptance of the water supply system, each section of the new line shall be disinfected in accordance with AWWA C651. One of the following sources of disinfectant shall be used:
 1. Mixture of water and chlorine gas;
 2. Direct application of chlorine;
 3. Mixture of water and calcium hypochlorite; or
 4. Mixture of water and calcium chloride.
- B. Before disinfecting, flush the line thoroughly to remove dirt and extraneous materials. Clean each section of the line between valves independently.
- C. Retain the disinfectant solution in the pipe for at least 24 hours. Following this sterilization period, the residual chlorine content at the ends of the section and at other representative points shall be not less than five parts per million. Then, the line shall be drained and thoroughly flushed with water until the residual chlorine content is similar to that obtained from the distribution system.
- D. Take water samples and test in accordance with AWWA C651.

3.04 IDENTIFICATION

- A. Comply with the requirements of Section 20 40 13 - Identification for Facility Services.

3.05 PAINTING

- A. Except where indicated, piping systems shall not be painted. Where pipes are indicated to be painted, as exposed pipe in finished rooms, prepare and paint pipe in accordance with Section 09 91 00 - Painting.

END OF SECTION 22 11 01